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BULLETIN of the
ATOMIC SCIENTISTS of CHICAGO

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"Operation Crossroads"

THE EFFECT OF THE ATOMIC BOMB ON NAVAL POWER

To the three atomic explosions which scorched, first a stretch of desert in New Mexico, then the cities of Hiroshima and Nagasaki, a fourth and a fifth will soon be added, at Bikini Atoli in the Marshall Islands, according to plans which have been announced by the Navy. The purpose, as stated by Admiral Blandy, who is in charge of the operation designated by the code-word "Crossroads," is "primarily to determine the effects of the atomic bomb upon Naval vessels in order to gain information of value to the national defense." According to Admiral Blandy, "This is not a combined or international operation, but rather a scientific experiment by the United States Government alone."

The first test, for which the Navy is assembling a fleet of 97 ships, including a battleship and a large carrier, is scheduled for early in May; in this test, the bomb is to be exploded over target ships at an altitude of several hundred feet. The second test is tentatively scheduled for July 1, and will be a burst at the surface of the water among target ships. A third test, in which a bomb will be exploded under water, is promised in the indefinite future, "certainly not this year."

Some observers have expressed concern because the tests are being conducted under Navy auspices.

To quote from Senator McMahon's letter to the President:

"It is very important that the people of the United States be entirely and completely convinced that these tests are being planned and will be executed to demonstrate fairly and conclusively the value of present-type Naval vessels.

"No more effective way to do this could be devised than for you to appoint a commission composed of outstanding civilians of superior scientific or engineering qualification to review both the preparation and execution of the tests. Their reports would be made to you, and you could release to the public those portions which would not prejudice our national security. If this procedure were to be followed, I suggest that the tests would be given greater credence and confidence than if the Navy alone had solely to do with them."

"I believe it is placing too great a burden on any Department of Government to require it to be solely responsible for conducting operations which might well indeed determine its very existence."

As scientists, we have some further misgivings concerning the merits of the $100,000,000 experiment. The Los Alamos laboratory is in a state of transition. Many leading physicists have left or are leaving for their peace-time positions, and new scientific personnel is being a s s e m b l e d. The early date of the first Navy test gives them very little time for the development of the necessary test instruments. It may be impossible even to adequately confirm the data already obtained at New Mexico, much less to gather new extensive scientific data.

The greatest weakness of the test, as outlined by the Navy, is that no provisions are indicated for studying the effects of the bomb's radiation on ships' crews. What might happen in a real case, is that a large ship, about a mile away from the explosion, would escape sinking, but the crew would be killed by the deadly burst of radiations from the bomb, and only a ghost ship would remain, floating unattended on the vast waters of the ocean. If not killed outright, the crew may well suffer such strong radiation damage, as to become critically ill a few days later.

From the point of view of mechanical damage to the ships, the overhead blast might reveal nothing which could not be estimated in advance from measurements made on the occasion of the three previous explosions.

The ground areas affected in Japan by such detonation were roughly only four miles in diameter. In the Navy's test in a Pacific lagoon measuring 12 by 27 miles the ships will probably be spread out considerably.

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ATOMIC ENERGY CONTROLS

4. Aerial Survey -- An Aid In Mining Control

by JEROME FISHER,
Professor of Geology

In the first article of this series (this Bulletin No. 2), international inspection and supervision of uranium mining was characterized as perhaps the most easily realized mechanism of atomic energy controls. The critical problem in connection with this type of control is whether mines not registered with the control commission could easily be discovered by the inspection agents.

1. We can take it for granted that a competent mining geologist is capable of examining and periodically reinspecting a given mining operation, and from such studies (not only in the field, but also including laboratory examination and analysis of samples collected) to reach a close estimate on the rate of production of all constituents of the rock being mined. This will be true also for geologists assigned by an international control authority to the inspection of uranium mines. But how can the inspecting mining-geologist make sure that he sees all mines? The land area of the earth is so large that even today, after hundreds of years of exploration, considerable portions of it are "terra incognita", so far as good published maps are concerned. What chance is there of inspecting all this for a U.N.O. control commission, and then of reinspecting it every few years for possible new developments, as well as for getting data to supply production rates? The answer is **none at all**, unless we think in terms of a new tool, the aerial photograph, that may well enable us to revise our knowledge of the surface of the solid earth as much as the atomic bomb should make us revise our thinking in the field of international relations.

2. During World War II, the U.S. alone is supposed to have photographed essentially the whole land area of the earth, except for the U.S.S.R., the Antarctic continent, and certain other smaller districts. While much of this was accomplished by flying stripes at 15-mile intervals, yet considerable portions of it were done twice or even repeatedly at much smaller intervals. All this was accomplished by one nation at a tiny

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fraction of the cost of prosecuting the war, and it could be done much more cheaply in terms of both men and materials under peace-time conditions, if suitable international agreements were made. Moreover, as World War II proceeded, immense technical advancements were made, reducing cost and increasing coverage. Further technical improvements of considerable importance can be confidently predicted in the future, especially if extensive photographic flying is continued. Whether each nation would be responsible for flying its own territory, or else contract this to others, or to an international agency, involve matters capable of relatively simple solution, once all nations have agreed to pool copies of aerial photos of the terrains involved. Whether all land must be examined, or whether certain extensive regions could be eliminated from consideration because of 1) thick coverage by glacial ice, 2) extremely dense tropical forests, or 3) terrain entirely unfavorable from the viewpoint of the geological occurrence of the materials needed, are all details which need not concern us at this stage of planning. Another detail, which may also be omitted from analysis here, is the tremendous scientific and other advantages which would accrue from making such information available for world-wide study. **Suffice to conclude that it has been demonstrated that the plan of obtaining aerial photographs at any desirable time interval of any and all significant land areas is definitely feasible technically at relatively slight expense.**

3. If strips of overlapping aerial photographs spaced 1½ miles apart (at suitable time intervals) of the land areas (or necessary portions thereof) were available, could all sources of production of A-bomb raw mineral materials be spotted, so that they might be inspected by mining geologists? Here, too, the experience of photo-intelligance groups for the armed services makes possible an almost positive favorable answer to this question. It is understood that no camouflage was successful against detailed study of aerial photographs, particularly when these were available with stereoscopic coverage. Perhaps the major object of camouflage against aerial observation was to temporarily confuse the bombardier using visual means to decide when to release his bombs. Methods were developed for study of aerial photos which resulted in the easy detection of small changes such as gun emplacements made during the period between successive flights. Such techniques could be used to prove that aerial photos supplied during second or later flights were bona fide, and not merely second prints from negatives made on an earlier flight, since natural changes such as trees that had toppled over or erosional effects between flights could be detected. Moreover, if necessary, photogrammetric measuring methods could be used to prove whether prints from supposed later flights were bona fide. Similarly photogrammetric methods could easily determine whether complete coverage was supplied. The "doctoring" of aerial photos to foil the trained student of photogrammetry seems out of the question.

4. The tenor of uranium and other ores is of course exceedingly variable. If we assume that 200 tons of metallic uranium would be the minimum needed to start an atomic bomb project, this would require the treatment of some 350 tons of the rich Katanga pitchblende ore, about 1000 tons of Great Bear Lake pitchblende ore, and perhaps 10,000 to 30,000 tons of Utah-Colorado carnotite ore. The amount of rock that would have to be moved or processed to yield these tonnages is presumably much larger than these figures, but no actual estimates are available to the writer. It is perhaps conceivable that if a rich deposit on a large body of water (such as Great Bear Lake) were discovered in an uninhabited area, and this discovery were kept secret, development could be carried out by a slave-type of labor without any surface indications that would show on aerial photos. This would necessitate the flying in of all personnel and supplies by hydroaeroplane, the building of underground habitations, and underground transport of all debris from these and the mining operations into the body of water. The difficulty of keeping such operations on the necessary scale secret over any extended period is so exceedingly great that it is highly unlikely that any such attempt will ever be made. It may thus be considered that aerial photographic methods could definitely be regarded as an effective control to uncover any mining operations of sufficient size to yield the necessary quantities of uranium or other rare metals needed in any A-bomb project. Of course this same control could be extended to mineral materials (other than sources of radioactive elements) needed in the manufacture of A-bombs; such as graphite, cadmium and beryllium-bearing minerals, and others; including those not now so utilized, but which will presumably be needed as new techniques are developed.

5. It may seem to be a tremendous task not only to take the necessary photographs, but to examine these with sufficient care. The opinion has been expressed that while for a war of limited duration the patriotic urge is sufficient to serve as a driving motive, so that capable workers trained to examine such photos will be available, there would be no such compelling force operating among any personnel set up to maintain peace. It is believed that this pessimistic prediction can be discounted because of two factors. First, if the peoples of the world will agree to go to such length as is implied by the interchange of aerial photos of their terrain plus mine inspection in order to help maintain peace, the relatively insignificant numbers of necessary workers who can be trained to deal competently with this subject can easily be found (including a continuing supply of replacements). And second, in spite of the clever devices developed during this war to make easy the detection of any man-made change in the natural terrain shown by aerial photos, it is certain that considerable technical improvements in such instruments will be forthcoming if the subject is studied in such detail as any aerial photo method of control would require.

6. The great advantage of the aerial photo method would seem to be that it is a definite and comprehensive objective-type preliminary step in control and that it would eliminate the more or less aimless and widespread wandering of geologically-trained inspectors in rather large numbers. Examiners working under the orders of a headquarters supplied with aerial photos would have definite objectives which they could go to directly; they could thus accomplish their missions with a minimum of annoyance to local people, and with a maximum of certainty that they were seeing all places where mining operations were proceeding.

7. As already indicated aerial photo control is but a part of the story. It is a good first step, however, since it covers the initial stage of operation of A-bomb production. The time factor is therefore such that any nation attempting to produce secretly such materials would be caught at an early stage, not when production was so far advanced that it might be too late.

Notes on Our Contributors

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THE ECONOMICS OF ATOMIC POWER - - Prof J. Marschak

International inspection of activities connected with fissionable materials will be much easier if all countries agree to postpone the development of large scale production of these materials and of their by-product, power. How much economic sacrifices would be involved in such a decision?

The study of the economic effects of atomic power may consist of two almost independent parts. On the one hand, there is the problem of how much a unit of energy will cost the energy-consuming factories or households. On the other hand, for any given level of this cost, one can calculate the cost of the finished product made by the energy-consuming plant; and this calculation can be followed by a study of the potential demand which would emerge if the product is made cheaper by a given percentage.

Coal is mined, transported to the power plant, and burned to make heat which is transformed into electricity; and electricity is transmitted to the consuming plant. Somewhat similar stages occur in the case of electrical energy derived from a pile. We can compare the following five cost items:

Energy from coal. Cost of		**Energy from atomic fuel. Cost of**
1. Mining coal		1. Producing plutonium in a pile
2. Transporting coal		2. Transporting plutonium **(no cost)**
3. Producing heat		3. Producing heat in a pile
4. Generating electricity	=	4. Generating electricity
5. Transmission of electricity	=	5. Transmission of electricity

The above table would not look differently if we considered oil instead of coal. Introducing into the comparison water power on the one hand, and isotope separation (instead of a pile) on the other, would somewhat modify the reasoning that follows; but the changes would not be essential for the purpose of this article.

Let us start with the bottom of the table. The equality sign in the 5th line means that the cost of carrying electricity from the power plant to an energy-consuming plant is the same with both kinds of fuel. This is obvious. Further, it has been asserted that there are no costly obstacles to feeding gas turbines with air heated in the pile. It is on the basis of this assertion that we put an equality sign in the 4th line. Finally, the cost of transporting plutonium is negligible compared with the cost of transporting a corresponding amount of coal: compared with coal, the bulk and weight of the amount of plutonium needed to generate a given number of kilowatt hours is practically zero.

It suffices therefore to compare the sum of items 1, 2, 3 on the side of coal with the items 1 and 3 on the side of atomic fuel. Even before doing this, we see at once what follows from the fact that cost item 2 is absent in the case of atomic fuel. Since its transportation cost is practically nil, to use this fuel is the more advantageous the greater the distance between the source of fuel and the power plant. Atomic power plants attached to widely spread mineral sites (or feeding the larger cities) of South America or Central Asia, not easily accessible by railroad or waterways, would compete with coal (or oil) more easily than atomic power plants would in, say, Pittsburgh (or Oklahoma). A mother pile would supply the distant power plant with fissionable material, with very little shipping cost. For the same reason, it may pay to use atomic fuel on long voyage ships and long range planes (provided they are large enough to carry shields protecting the crew against radioactivity).

What will determine in general the marketing radius of coal (or oil) in its competition with atomic power? Items 1, 2, 3, on the coal side of our table are the costs of extracting, transporting, and burning coal. On the atomic fuel side items 1 and 3 are the costs of running as well as amortizing the piles; or rather the part of these costs that is charged to the energy put out, and not to other products resulting from the fission. The cost of running a pile consists of wages of the maintenance and supervision personnel, and of the cost of raw materials (uranium or uranium ore, graphite, etc.) and replacement parts. Amortization depends on the speed of wear and tear and obsolescence of the non-renewable, fixed parts of plant and equipment.

The costs are to be charged jointly to the four economically distinct products of the pile: heat; fissionable material for use as fuel; fissionable material for use as explosive; and various radioactive fission products for use in research and medical work. The stronger the demand (the higher the prices) for the latter two products, the lower price can be charged for the former two, unless the proportions in which the various products are made can be freely adjusted at will. Now, it is true that the proportion between the amount of fissionable materials and the electricity produced depends on the temperature at which the pile is operated. It is sure, however, that military demand cannot be subjected to fine calculations of price and cost; and it is probable that military considerations favor the creation and operation of decentralized daughter plants at home and in friendly zones. It is likely, therefore, that military demand for explosives will not obstruct but foster the production of energy and fuel, probably at nominal cost. In particular, amortization is likely to be charged off to military needs (as should be the case, in fact, with the plants that have already produced the victory of August, 1945).

Thus, atomic fuel becomes a more effective competitor of older sources of energy if the international atmosphere continues to be tense. But as long as this competition can only be maintained by a subsidy, viz., by the military payments for the explosive, the use of atomic energy instead of coal does not give any economic advantage to the nation. It is true, however, that by accelerating research and accumulating experience, subsidies may indeed reduce the true cost of atomic energy sooner than if it had been exposed to free competition.

Suppose now that the cost of energy based on atomic fuel has been successfully reduced below the cost of coal—or oil—based energy, at least in some parts of the country. What will be the economic consequences?

A partial replacement of coal by atomic fuel may mean, on the one hand, the release of people engaged in mining and transportation, not fully compensated by an increase of workers operating the piles. The net increase of leisure will then take the form of unemployment or can be spread evenly by shortening working hours. But, as an alternative, labor can continue to be used at the old rate, if demand is found for an increased amount of goods, sold at cheaper prices or in new qualities. Society decides, as it were, for more leisure or more goods. If it decides for more goods, and if among the additional goods are, again, devices that save labor, the same dilemma is repeated. The steam locomotive did more than displace the coachmen, horse grooms and oat growers: it opened up new demand. In the past, leisure and national products have increased hand in hand.

The pure "leisure-effect" of cheaper energy is small. Even if all coal and oil used in stationery power plant were replaced by fuel of zero-price, only about a million workers would be released. This is equivalent to reducing the nation's working week by, say, 45 minutes. As to the effect on the national product, it depends on whether large demand can be found for cheapened or new products of such industries as steel, aluminum, electrochemistry, glass, paper: these are large consumers of power (though, in the case of steel, coal is a chemical agent and not only a power

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A SCIENTIST VIEWS THE WORLD SITUATION -- H. C. Urey

First of all, let us note that the atomic bomb is not the fundamental problem at all that we have to face. The fundamental problem is war. If there is another war, atomic bombs will be used.

NO DEFENSE AGAINST THE BOMB

There is no defense against this bomb. It is perhaps not very exact to say that there is a defense against any other methods of making war. We think we have defenses against submarines, but they destroyed a very considerable fraction of the shipping in the Atlantic and Pacific oceans. There are defenses against airplanes, but they destroyed the cities of Germany and Japan and did great damage to the cities of England.

In a future war atomic bombs will produce an amount of destruction commensurate with their ability to cause destruction and that will be sufficient to destroy the cities of the world.

From another point of view, there is no possible defense for the reason that the atomic bomb is a instantaneous saturation weapon. If one can attack a city in sufficient strength so that all facilities of the city are interrupted at almost exactly the same time, it is not possible to put up an effective defense. I think it is useless to talk about an Army or a Navy or an Air Force if we are thinking that they are the traditional weapons which, floating around the edges of the United States or in the air above or on the land beneath, will prevent the destruction of the cities of this country. They may be able to defend themselves. I am interested in these things only if they give safety to the people of the United States and if they cannot do that, whether they can defend themselves or not, is relatively unimportant.

THE POLICY OF IMMEDIATE WAR

At the present time, we are making atomic bombs, and no other country is. This situation will go on for some time. I don't know how long, but I should judge a few years anyway, maybe five years. Then other countries will begin to get atomic bombs. Finally, everybody will have a completely adequate store of atomic bombs so that we can destroy all the cities of any possible enemy on both sides. After that, it makes very little difference whether further atomic bombs are developed or not.

I think there is a great temptation on the part of certain people to say, or at least to act, as though we were going to attack another country while we have a lot of atomic bombs and they have none. One sees talk of the largest Navy that has ever existed in the world. One sees discussion of an enormous Air Force.

This sort of set-up, together with atomic bombs, would seem to indicate that perhaps our policy is to engage in a war just as soon as possible and take charge of the world and run it according to our own ideas. Suppose we do that. What will we do next? Of course, merely knocking the cities of a country to pieces will not solve anything at all. Will we undertake to occupy the country and run it according to our own ideas? Shall our sons spend their lives policing the rest of the world?

I do not believe that this solution is a good one, and I am sorry to say that we are acting, it seems to me, as though this were our proposed solution. I doubt if anyone has thought it through. I think that we are behaving in this way because of inertia rather than any intent on the part of any large fraction of the citizens of the United States or on the part of our officials in Washington.

A WORLD OF ARMED CAMPS

Another possibility is that we will not in the course of five years make use of our stockpile of atomic bombs while other countries do not have them, but we will have a group of armed camps in the world. We will have outposts on Okinawa, and then Russia should be entitled to outposts on, well, somewhere in the region of Hawaii in order to have its position comparable to ours.

Impossible situation. We would all live in consfant fear that the other man's itchy trigger finger would start something moving in a very short time.

This, I think, will happen in the case of armed camps, and the end result will be that the war will start and perhaps 40,000,000 would be killed in the United States during the first attack. It would be an equivalent number in another country, and I think that the war would soon reach a place where it wouldn't make any difference who won; in fact, it might be difficult to establish who did win the war.

DEMOCRACY WILL VANISH

If we live in that kind of world, we will have no democracy in this country at all. The process is starting already. We don't know how many atomic bombs we have. Now for the first time in the history of the United States we don't know the approximate strength of our armament. We have always known how much of a fleet we have. We make a great fuss every time we launch a new battleship or aircraft carrier in peace or in time of war. We know how large an Army we have. We know approximately how large our Air Force is. These things have been matters for public discussion.

Of course, if we tell how many atomic bombs we have we would tell the whole world, and that's the reason for not doing so. We must realize, at the same time, however, that we have lost an essential part of our democracy. The people of the United States no longer have an important factor for knowing what should be done.

This will go on if we live in an armed world of this kind. It will be necessary for us to have a quick way to move. We may find that the other fellow intends to attack next week, and we cannot call Congress together and have a discussion of whether we had better declare war today or not because the atomic bombs would wipe out the Capitol while Congress was discussing the matter. It would, in such a situation, be necessary to have the power of declaring war in the hands of some individual or a very small group of individuals who could meet secretly and decide such an important question without the people of the United States knowing that it was being done.

Of course, if someone has that power, then he must also have the method of preparing for the emergency, and that means that appropriations will have to be made by a small group of people. If we move on in the direction of armed camps in the world I cannot see any possibility that democracy will survive anywhere.

WORLD GOVERNMENT NEEDED

I think we are finally driven to a solution that most of us will agree is improbable. (If you would ask me to guess what the probabilities are, I would say that the highest probability should be assigned to a world disaster, but, even if solutions look improbable, I think we must work for those improbable solutions anyway and try to increase their probability.)

It seems to me that we must expect some sort of world government with adequate powers to prohibit atomic bombs. It must have the power to police the world to see that such laws are obeyed.

The United Nations Organization is not a government of that kind. We should attempt, then, to strengthen that organization in such ways as to make it a more effective world government.

The first step is to convince the people of the United States as to what the situation is. We may wish that other countries would understand this also, but that is not something that we can do very well. The thing that we can do is to explain the situation to the people of this country and try to get people in this country willing to have this country undertake to do its part in such a proposal. As this country moves in that direction, perhaps other peoples of the world will trust us more than they do at the present time. Perhaps they also will go along.

* * *

This is a condensation of a speech by Prof. Urey before the Conference of Churchmen and Scientists at the University of Chicago on Feb. 6.

CONGRESSIONAL NEWS . . .

Senate Hearings on Atomic Energy

We resume our reports of the hearings before the Senate Special Committee on Atomic Energy, beginning with the session on January 29.

The testimony of **Admiral Blandy**, presented on January 24, which dealt with the proposed Navy test of the atomic bomb, was extensively reported in the daily press. A critical appraisal of these plans is given in another article in this issue.

January 29. **Harlow Shapley** (Director of the Harvard Observatory). "In general, I find S. 1717 (the McMahon Bill) highly satisfactory. Those who prepared S. 1717 have done an excellent service for the scientists as well as for the public." Dr. Shapley pointed out the urgency of good interim legislation and suggested that the proposed bill be considered as such rather than as a permanent statute. He said, "A statement to the effect that 'for a period of one year, no information about atomic bomb assembly and use can be released' would probably allay the fears of many and still not seem too crippling to scientific research and development. . ." He did not personally think such a statement was necessary, but though it might be expedient in view of apparent fears that we are about to give away "secrets."

Dr Shapley's most important criticism was directed against the form of the commission. In agreement with K. T. Compton and J. C. Conant, he would favor a "single full-time administrator, with full-time divisional directors . . . and an unpaid advisory committee, in order to get the services of the better men. . ." In answer to this suggestion, Senator McMahon made the remark that unpaid advisory boards usually give just about as much service as they are paid for. Dr. Shapley admitted that this proposal would give great power to the single administrator, since the conclusions of the technical advisory board would be merely in the nature of advice to the commissioner. He emphasized the desirability of coordination of this Commission with UNESCO and the proposed National Science Foundation. He thought it "advisable to seek a common and consistent policy with regard to patent provisions" of the Atomic Energy Bill and the National Science Foundation Bill.

I. I. Rabi (Columbia University). Prof. Rabi expressed his agreement with the "intent and provisions of S. 1717." He felt that the establishment of separate divisions of research, production, materials, and military applications, as provided in the bill was "in line with the best experience in industry and science." He was in favor of a completely civilian commission having adequate liaison with the military. Senator Millikin asked if it were not true that during the war the greatest scientific advances were made under military direction. Dr. Rabi replied that they had been made with military "connection" — the military supplied the money — rather than under military "direction." Senator McMa-

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PRESIDENT TRUMAN ENDORSES THE McMAHON BILL

You have requested my views on S. 1717, a bill for the domestic development and control of atomic energy. I wish to give you my thoughts at this time because I consider the subject of paramount importance and urgency, both from the standpoint of our welfare at home and that of achieving a durable peace throughout the world.

I appreciate the thorough and impartial manner in which atomic energy hearings have been held before your committee. I believe that the hearings, in keeping with democratic tradition, have aided the people in obtaining a clearer insight into the problems which such legislation must meet.

You will recall that I sent a special message to the Congress on Oct. 3, 1945, calling for legislation to fix a policy for the domestic control of atomic energy. Since then I have given considerable time to the further study of this most difficult subject. I have had the advantage of additional technical information and expressions of public opinion developed at the hearings. With this back-ground I feel prepared to recommend in greater detail than before what I believe to be the essential elements of sound atomic energy legislation:

(1) A commission established by the Congress for the control of atomic energy should be composed exclusively of civilians. This should not be interpreted to disqualify former military personnel from membership, and is in accord with established American principles embodied in our statues since 1870. I would prefer a three-man commission in lieu of a larger group, which administrative experience has shown unwieldy. It is essential that the members of the commission be full-time Government employees.

(2) The Government must be the exclusive owner and producer of fissionable materials. (Fissionable materials are, of course, to be distinguished from source materials from which fissionable materials may be derived. By fissionable materials, I mean such as U-235, or plutonium, or any substance enriched in these beyond its natural state.) It follows that there should be no private patents in this field of exclusive Government activity.

The disadvantage of Government monopoly are small compared to the danger of permitting anyone other than the Government to own or produce these crucial substances, the use of which affects the safety of the entire nation. The benefits of atomic energy are the heritage of the people: they should be distributed as widely as possible.

(3) Consistent with these principles it is essential that devices utilizing atomic energy be made fully available for private development through compulsory, non-exclusive licensing of private patents, and regulation of royalty fees to insure their reasonableness. These provisions will assure widespread distribution of the benefits of atomic energy while preserving the royalty incentive to maintain the interest of private enterprise.

(4) In my message of October 3, I wrote: "Our science and industry owe their strength to the spirit of free inquiry and the spirit of free enterprise that characterize our country . . . (This) is our best guaranty of maintaining the preeminence in science and industry upon which our national well-being depends."

Legislation in this field must assure genuine freedom to conduct independent research and must guarantee that controls over the dissemination of information will not stifle scientific progress.

Atomic energy legislation should also insure coordination between the research activities of the commission and those of the proposed National Science Foundation, now under consideration by the Congress.

(5) Each of the foregoing provisions for domestic control of atomic energy will contribute materially to the achievement of a safe, effective international arrangement making possible the ultimate use of atomic energy for exclusively peaceful and humanitarian ends. The commission should be in a position to carry out at once any international agreements relating to inspection, control of the production of fissionable materials, dissemination of information, and similar areas of international action.

I feel that it is a matter of urgency that sound domestic legislation on atomic energy be enacted with utmost speed. Domestic and international issues of the first importance wait upon this action.

To your committee, pioneers in legislation of vast promise for our people and all people, there beckons a place of honor in history.

Harry S. Truman.

CONGRESSIONAL NEWS

SENATE COMMITTEE ON ATOMIC ENERGY

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hon asked if it were not true that the sole contribution of the army to the success of the Manhattan District Projects was furnishing the money, making security regulations and handling procurement problems. Dr. Rabi replied that his connections with the Manhattan District were hardly sufficient to permit an authoritative answer to that question.

January 30. **Watson Davis** (Director of Science Service). Mr. Davis stressed the importance of international interchange of scientists and scientific information if science is to continue its rapid development. He thought the exact details of the bomb should not be divulged until satisfactory international agreements were obtained. He thought that no military man or ex-military man should hold a position on the proposed atomic energy commission. This he considered necessary from the standpoint of world confidence and scientific progress. He considered human behavior to be a key factor in the problem of international control of atomic energy and suggested that the committee hear testimony from psychologists on this point. He thought that possibly a single administrator with an advisory board would be preferable to the five man full-time commission specified in the McMahon bill, but thought the matter relatively unimportant.

January 31. **John Von Neumann** (Princeton University). "For the first time in history science produced results which require an immediate intervention of the government. It is now that physical science has become "important" in that painful and dangerous sense which causes the state to intervene.

Many scientists regret this, and I am one of them--but nobody can change it.

Regulation is needed, because nuclear physics, in combination with irresponsible or clumsy politics, could at this moment inflict terrible wounds on society. And with some more development, which probably will be effected in a moderate number of years, the same combination of physics and politics could render the surface of the earth uninhabitable.

Regulating science is a matter of extreme delicacy. Strict regulation, and even the threat or the anticipation of strict regulation, is perfectly able to stop the progress of science.

Damage to fundamental science would soon cause comparable damage in the technological and then in the economic sphere. Finally, since other countries may not be similarly affected, it would seriously impair the national defense.

For all these reasons I am convinced that it is necessary to protect the natural modus operandi of fundamental research: freedom in selecting the subject of research and freedom in publishing its results. Any attempt to subdivide nuclear physics is futile from the start. Science, and particularly physics, forms an indivisible unity, and no attempt to compartmentalize it will produce anything but disappointment; and to put all of atomic physics, or all of physics, on the restricted list would clearly kill the physical sciences.

It is plausible that nuclear explosives and radio-poisons should be subject to safety and health regulations. This has always been so for dangerous substances. There must, however, be no restrictions in principle on research in any part of science, and in nuclear physics in particular, and absolutely no secrecy or possibility of classification of the results of fundamental research.

It is generally admitted that we should have a highly efficient Army and Navy. It would be inconsistent to forbid them to work on the development of atomic weapons.

I think that the Commission, the Army and the Navy all three should have a right to work on military uses of atomic energy.

I feel that since the Commission is to be policy-making, the Cabinet should be directly represented on it, and its character should be civilian.

The idea that the Commission should make periodic reports to the President and to Congress seems to me to be a sound one. I doubt, however, that quarterly reports are necessary. Yearly reporting would be more nearly right.

Senator Hart: Do you believe that there should be as free interchange of fundamental developments in science with scientists abroad as there is within our own country?

Dr. Von Neumann: If we try to prevent interchange of information with foreign scientists, we must also regulate it at home. The machinery which is necessary to avoid information from getting abroad would certainly lead to compartmentalization and loss of scientific morale at home.

Senator Millikin: Is it practical to have a free interchange of scientific information between the nations without at the same time having a free interchange of all other kinds of information, such as political information?

Dr. Von Neumann: I think it would be very desirable to have a free exchange of political information. However, if for any reason we cannot have it immediately, I don't think we would gain anything by preventing the exchange of scientific information.

Senator Millikin: Do you think we are warranted in turning this subject over to an exclusively civilian committee? We spent two and one half billion to reach our present state. Assume that three-fourths of it was wasted, you are still talking in terms of $500,000,000. Who is ready to put up $500,000,000 to produce nuclear energy for peacetime purposes?

Dr. Von Neumann: The government would do well to spend sums of this magnitude on this subject. If it is to be developed by private enterprise, I would expect that there would be private entrepreneurs who would be willing to do it.

The Chairman: Do you think we would be warranted as a Government in spending money on a large scale for peacetime experimentation and research in this field.

Dr. Von Neumann: I would think the possibilities are so enormous, that it would justify continued Government support.

The Chairman: Would you, as a citizen, forgetting all military applications, want this country to be second in the matter of atomic energy?

Dr. Von Neumann: I think it is important that the country should be first in industry and research.

Senator Millikin: It is also bad to become a second-rate nation through insolvency.

Dr. Von Neuman: I would think the question is whether insolvency threatens or not.

Raymond Swing (news commentator). "I have two chief points. One is the tremendous importance of our atomic-establishment in our international relations. The other is the need of keeping atomic energy under the control of the American people to whom it belongs.

At this moment the United States is manufacturing atomic bombs. It will be manufacturing them next week, next month, or unless the President puts a stop to it, or the War Department does so, or Congress does so, it will be manufacturing them next year, and the year after, and as far ahead as can be seen.

While we wait for the atomic commission to go to work, the United States continues to manufacture the bomb. And if that is not something that worries people in this country, we can be sure that it worries people in other countries. Of all the specific elements of relative power, our exclusive possession and continued manufacture of the atomic bomb is an outstanding cause of worry to people abroad.

We should stop making it, and we should take the control of the installations for making it out of the hands of the military just as quickly as possible.

For the Army is making **only** atomic bombs, and as long as the Army runs the atomic project, that is all that it will make. There can be little development of atomic energy for non-military purposes as a result of the two billion

(Continued on Page 9)

THE COMMON MORAL TASK -- Dr. Bernard Iddings Bell

A Midwestern Conference of Religious leaders and Atomic Scientists took place at Chicago on February 5, 6 and 7. While the religious leaders came to the conference in quest of more authoritative information on the scientific background and political implications of atomic power, the scientists were anxious to know what the impact of the atomic bomb was on those who appraise events in terms of moral and religious values. We reprint the following address by Dr. B. I. Bell, as the answer of one prominent churchman to this question.

* * *

None of us has been totally ignorant of what you have produced or have begun to produce by the release of atomic energy through fission. Some of us have been aware of the progress you have been making in atomic science even before the world at large was shocked into attention by the atomic bomb. Everyone of us has been glad to get at first hand, from those who are leaders in atomic science, the reports which you have already graciously given to us. We have learned a great deal.

Our happiness, however, is not due merely to what we have learned but to a sense of reassurance that comes to us as we realize that atomic scientists have been forced to face that which it has been our particular business to face and understand, namely the moral collapse of modern man.

Physical scientists have been, it seems to us, largely unaware of that collapse and this for a reason entirely creditable to them. The physical scientist has been engaged in, and all of his attention has been focused upon, his scientific investigations. This has necessarily involved his lack of attention to what has been happening in the realm of ethics and politics. Moreover, it is true beyond doubt that with few exceptions scientists are the most unselfish class of people in our day. They are singularly free from the lure of greed and the temptation of desire for applause. They are peculiarly free from the usual desire to dominate their fellow men. They are in pursuit of truth, and in that pursuit they find their satisfactions.

Now, however, the atomic scientists have discovered that that knowledge, which by long and careful study they have come to master, is being used, and is in danger of being used to a disastrous extent, by a world of greedy, self-seeking people intent individually and nationally upon what they can manage to get for temselves even at the cost of the common welfare. The atomic scientist has discovered the deplorable state of modern man. He has found that it is unsafe to put his confidence in princes even in allegedly democratic countries. He has awakened to the fact that his science, all science, along with every other human endeavor is in danger of destruction by the ignorant and willful wickedness of those in control of modern life. He has begun to see that the common man of the moment is all too usually a fool, and that the uncommon man is all too frequently a knave. Those of us that have to do with religion and with morals as related to religion have known this for a long time. We have looked upon contemporary society and have seen that the motivations of men have become alarmingly subhuman. Everything about us that determines the mores, the literature and newspapers, the motion picture, the radio, even education itself has tended to persuade our growing youth to look at life as though the satisfactions to be sought are found in possession, in amusement, in desire for applause. These are all subhuman ends.

The teaching of religion, whatever creed it may be framed in, has always been that man arrives at significance, happiness, and, incidentally, safety only in terms of creativity. The Jewish and Christian religions say that man is made in the image and likeness of God. By this they do not mean that man physically resembles God, that his hands and feet and body and face look like those of God, for God is without parts or passions; He has no body; He is pure creative spirit. To say that man is made in the image and likeness of God means that he finds his meaning in doing that which God can do, in creativeness. Man can not create on the scale that God can create; but in his little way, given his limited mind and powers, he can create; he can bring order out of chaos, beauty out of ugliness. Man can be an artist and is meant to be one. More especially man can be an artist in terms of human relationships. He can be a lover. If he lives to become an artist and a lover, individually he can be happy and socially he can be safe. But if he denies this human destiny and lives for possessions, pleasure and power, individually he is always restless and socially he is self-destructive. So religion teaches, and we are persuaded that the long record of human behavior verifies the teaching.

It is modern man's failure, due to his denial of his human destiny, which has within it the elements of human woe which are apparent all around us.

The time has come when the scientist, aware of all this, finds himself no longer confined to the laboratory but interested in the world of men. The time has come when the scientist understands that unless the mores can be changed, and changed very quickly, unless man's conduct can be changed from a subhuman level to a human level, all that remains before us is catastrophe.

The thinking scientist is now brother to the thinking religionist in resistance to the mores. The thinking scientist like the thinking religionist is a rebel against modern life and the things upon which it is built. We are comrades, to an extent that we have not been comrades for too long a time. We have much to learn from one another and much encouragement to give to one another for the difficult task of human rescue. It is because we who are of religion realize that interdependence and because from what we have heard here we know that you equally realize it that we find in this conference a great encouragement.

More on

SENATE HEARINGS

dollar investment of the American people.

For the time being the military importance of atomic energy must be considered as outweighing its use in a civilian economy, but in drafting legislation for the control of atomic energy a longer view may wisely be taken. If atomic energy is conceivably to become the source of power of the future which will do a great part of the work of the world, we face what is perhaps one of the greatest tests of wise government that ever has confronted a democracy. For the control of the power resources of the nation and the world means the political control of the nation and perhaps of the world. And the possibilities at stake require the recognition of certain principles in setting up the future development of atomic energy. One is to safeguard, as one would safeguard the nation itself, the people's sole ownership of atomic energy and control over it.

Whatever the Congress decides as to the size and constitution of the board which controls atomic energy on behalf of the people, it must devise the most immediate responsibility of that board to the people. For that reason it appears desirable that the members of that board should serve, as proposed in the McMahon bill, at the pleasure of the President.

A special word should be said on the importance of this board being composed exclusively of civilians. If, as appears possible, atomic energy is ever to become the source of the future power of much of our economy, and control over it is to be tantamount to control over the welfare of the nation, it is axiomatic that this power should not be vested in peace time in a soldier.

There is really little reason to be thinking about competitive society and private enterprise in drawing up the basic legislation about atomic energy. What must be safeguarded is the treasure of the people. Atomic energy was released by their government, spending their money, serving their interests. It was not done by or through private enterprise, though the contribution toward success by men in private enterprise has been very great. Atomic energy does not in any sense belong to anybody **but** to the people of the United States."

RUSSIA AND THE ATOMIC BOMB

One of the points which atomic scientists have consistently tried to impress on the public opinion, is that America cannot expect to remain for long in the exclusive possession of atomic weapons, since other nations have enough scientific and industrial power to develop their own atomic bombs within a few years. The point also was made that after a few years the American policy will not be able to proceed on the assumption that we alone have atomic bombs, quite independently of whether other nations will make their achievements public or not.

Periods of between two and ten years were suggested by various scientists as the minimum time required for any nation to develop its own atomic bombs. A foretaste of "atomic jitters" which the world can confidently expect at that time, if no international control and inspection agreement is consummated by then, is given by a succession of stories on "Russian atomic bombs," which have been making the rounds of newspapers and magazines in the last few weeks.

Some of these stories — like the one attributed to an Irish anthropologist — bear the stamp of unreliability in their very source. Others, attributed to confidential sources, and sometimes supported by allegedly authentic secret documents, reveal themselves as fabrications by the use of such scientific nonsense as "cyclotrons fired from five mile distance," "atomic shrapnel" (allegedly used by Russians in the last phase of the German war), or "new atomic explosives invented by an eighty-six year old organic chemist," — not to mention the inevitable "small-size atomic bombs" and "subatomic bombs."

Even if these stories are not taken seriously by anyone able to excercise some scientific judgment, they contribute their share to confusing public opinion and poisoning the international atmosphere.

Nobody can doubt that as long as the fabrication of atomic bombs is not made impossible everywhere by an efficient international control, Russia (and other countries as well) will bend all its efforts to mastering the techniques of the production of these weapons. A sober evaluation of the situation is not helped, however, by attaching sinister implications to all news of the progress of atomic physics in Russia. Even reports which have some foundation in fact, are distorted by the tendency for such sensational presentation. An example is the story carried by all newspapers on February 2, under the title "Russians Have Split the Atom."

It attributed to foreign embassies in Moscow the intelligence that (quoting from the N. Y. Times) "Soviet scientists have accomplished an important step — the spontaneous splitting of the uranium atom." The basis of the report was the award of the Stalin prize to two young physicists, Petrzhak and Flerov. The papers commented with astonishment that only a second prize was awarded for such an important achievement as "splitting the uranium atom."

DISCOVERY OF SPONTANEOUS FISSION

After Hahn and Strassman in Germany had shown, in 1939, that uranium atoms, bombarded by neutrons, split into two approximately equal parts, every physicist in the world, who had available a little radium (to make a neutron source), a little uranium (to serve as target) and some simple measuring instruments, knew how to "split the uranium atom." The "atom-splitting" experiment was repeated, as a matter of course, also by many Russian scientists, and nobody would have dreamed of awarding them prizes for that. Whatever a single scientists had learned about "atom-splitting", was "known to science" and thus a common property of scientists everywhere.

Of the Russian physicists who took up the study of atom-splitting, Petrzhak and Flerov, made a year later, in 1940, an interesting discovery. They found that atoms of uranium and thorium — the same elements which can be split artificially by neutron bombardment — also undergo an extremely slow natural splitting, without being exposed to any bombardment at all. An analogous discovery in the field of ordinary chemistry would be to have found that out of a million shells stored in an ordnance storehouse, one will explode, all by itself, once in a million years, without the detonating mechanism being put into action. This discovery — the most important Russian contribution to the knowledge of atomic fission to date — was rewarded, five year later, in 1945, by the Stalin prize. It was this award which caused the alarm of the Allied embassies in Moscow. (Incidentally, the announcement of the award was made several months before the American Embassy in Moscow suddenly took notice of it.)

The discovery of Petrzhak and Flerov was well known to scientists all over the world since 1940. However interesting theoretically, it is in no sense a "step towards the production of an atomic bomb."

NUCLEAR PHYSICS RESEARCH IN RUSSIA

What the achievement of Petrzhak and Flerov does prove, is the high level of research in nuclear physics in Russia. Because of extreme weakness of the spontaneous fission effect, it could be discovered only by extraordinary skillful experimentation.

Russia had, however, in 1940, a number of scientists with good international reputations who specialized in nuclear research. Very few publications in this field have come out of Russia since 1941, but the scattering of the research groups and evacuation of equipment before the German onslaught provides sufficient explanation for this interruption — even though the imposition of secrecy from above cannot be excluded since Russian physicists had begun discussing the possibility of producing atomic energy from uranium fission as early as 1939.

Before the war, the leading groups of Russian nuclear scientists were working at Leningrad, Moscow and at Kharkov in the Ukraine.

At Leningrad, the three leading laboratories were State Radiation Institute, the Physico-Technical Institute and the Institute of Chemical Physics, all three being parts of the Academy of Sciences of the U.S.S.R. G. N. Flerov of the Physico-Technical Institute collaborated with K. A. Petrzhak of the Radium Institute in the above-mentioned discovery of spontaneous fission. A cyclotron was constructed at the same institute and artificially radioactive indicators were used for the study of chemical kinetics as well as of certain biological problems.

At the Physico-Technical Institute at Leningrad, we find in 1940 a group of nuclear physicists, centering around Prof. I. V. Kurchatov. It included, in addition to G. N. Flerov, A. I. Alikanov and A. I. Alikhanian, who also received the Stalin prize for physics in 1945.

At the Institute of Chemical Physics J. B. Zeldovich and J. B. Khariton were among the first to make calculations on the possibility of a nuclear chain reaction.

At Moscow, the work in nuclear physics was concentrated at the Lebedev Institute of Physics, also belonging to the Academy of Sciences. There, V. I. Veksler suggested, in 1943, a resonance method of producing super-speed electrons which was re-discovered independently in U.S. in 1945. Prof. D. V. Skobeltzyn of the Lebedev Institute directed a series of investigations of cosmic rays on the Mt. Elbrus in the Caucasus. It was apparently this group which, assisted by Prof. Kapitza in the contribution of a large magnet, recently made the discovery in cosmic rays of a new elementary particle — the negatively charged proton. (This discovery too, was sensationalized in newspapers as a "new way to produce atomic bombs!") Another group studying cosmic rays is working at Alma-Ata in the Turkestan, under the astronomer B. Fessenkov.

At the Ukrainian Physico-Technical Institute at Kharkov, another large group of nuclear physicists worked in 1940 under Prof. A. I. Leipunsky — one of the first physicists to analyze, in 1939, the possibility of using uranium fission

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Declassification Comm. Issues Report

About three months ago, Maj. Gen. Groves appointed a seven-man committee of scientists to formulate recommendations for the release of technical information obtained throughout the atomic bomb project.

The members of the committee are: R. C. Tolman, chairman, R. F. Bacher, A. H. Compton, E. O. Lawrence, J. R. Oppenheimer, F. H. Spedding, H. C. Urey.

The first report of this committee, which was issued on Feb. 5, stated:

"It has not been fully appreciated that a great mass of scientific and technical information has been accumulated during the course of the research and development work on the bomb and that this is of enormous potential value to the peacetime science and industry of the country—not only in the field of nuclear science but in many other fields —if it can be made available. At present it is locked up in the files of the various academic and industrial organizations that did the actual work, and nobody is permitted to make use of it except for the manufacture of atomic bombs. The Army wishes to modify the existing secrecy restrictions which were necessitated by the war, and desires to make useful scientific and technical information generally available, where this can be done without endangering our security."

The committee has classified the facts in three divisions. First is the nonsecret information which will be made public as early as it can be put in proper form. Second is information which may be released over a somewhat longer range if the first plan does not stir up controversy within the nation. Third is the information which involves the details of the bomb, and which will be released, if at all, only by the President and Congress, since it involves the national security.

Power Economics

(Continued from Page 3)

source, and cannot be fully replaced). If aluminum trains or houses or pots and pans can be made at a price reduced by, say, 10%, both near and far from water power, how much can be absorbed by U.S.A., South America, China? What new products can be visualized as capable of absorption by the population of the earth?

Society may decide for more goods or more leisure; it is also interested in preserving resources for future generations. It may be unwise to exhaust uranium ores, with their unique properties, too soon, while large reserves of coal are accessible.

We see that at present the economic advantages of atomic power plants are uncertain. The political danger, on the contrary, is obvious. Reaching for a few strawberries on the edge of a precipice we may fall and break our necks.

Russia and The Atomic Bomb -- continued

towards production of an atomic bomb for liberation of atomic energy.

In the Ural mountains, at the Sverdlovsk State University, a group under Prof. D. Ivanenko was working in 1940. Many sections of the Academy of Sciences in Leningrad were evacuated to Sverdlovsk during the war.

Russia also has a number of first-class theoretical physicists, such as Profs. I. Tamm, J. Frenkel, and L. Landau, and mathematicians, such as Prof. A. N. Kolmogorov, capable of working out the theoretical foundations of a plutonium pile or of the atomic bomb itself.

In addition to physicists, the Atomic Bomb Project has required the cooperation of a large group of chemists. They were concerned mainly with the separation of plutonium from uranium and from the fission products. This was a difficult chemical problem, which required the development, on a previously unimaginable scale, of laboratory processes used for the separation of minute amounts of radioactive elements from large quantities of inert material. In this field, Russia is particularly well prepared, because of the work of Prof. V. G. Khlopin and his co-workers in the State Radium Institute. For years, this group has done the most advanced work in the field of separation of radio elements.

GERMAN SCIENTISTS IN RUSSIA

Another group of scientists to be considered in connection with the development of atomic energy in Russia, are the German physicists who went to Russia — more or less voluntarily — from the Russian zone of Germany.

Some information in this respect was given recently by W. Westphal, Professor of Physics at the Berlin-Charlottenberg Institute of Technology, in an interview with American correspondents.

The list included Prof. Gustav Hertz, who shared the Nobel prize with Dr. J. Franck in 1925. He is perhaps the best qualified man outside USA to lead research on U-isotope separation by gaseous diffusion, since he was the first to use this method for the separation of neon isotopes way back in 1930.

Prof. F. Volmer, Profesor at the same school is an internationally know physical chemist, specializing in surface chemistry. Prof. M. Steenbeck is a specialist in gas discharge physics, and was previously associated with the research laboratory of the Siemens concern in Berlin.

Manfred von Ardenne was well-known as inventor and "gadgeteer" in the field of electronics, short waves, etc. Before the war, except von Ardenne, who had atory in Berlin. According to Westphal, he is assigned the task of building a cyclotron.

As far as can be ascertained, none of these scientists has been active in the German Atomic Bomb Project during the war, exvept von Ardenne, who had a small independent atomic power project sponsored by the Postal Department.

Even though these German scientists may offer considerable help to Russian efforts in the field of atomic power, the USSR will have to rely mainly on its own scientific brain power.

Although Russia does not posses an array of great leaders in nuclear physics, comparable to that assembled in the Manhattan Project, the high general level of scientific research in Russia, permit no reasonable doubt that the task of producing atomic explosives and bombs will not be impossible for them, quite independently of any revelations which may or may not be forthcoming from the Allied side.

ASC Publishes Booklet "The Atomic Bomb"

The ASC booklet on atomic energy has at last come off the press. Started some months ago for the purpose of providing understandable, accurate information for the members of Congress, it has gone through successive stages of evolution. Its final form is that of an illustrated, 64-page booklet, printed by the Buckley-Dement Company of Chicago. Lay-out work was done by a well-known artist, Mr. Taylor Poore, and the text is the result of a collective effort of a number of the members of the Materials Committee.

A foreword by the Advisory Committee, an introduction by the Executive Committee, and a two-page summary of the facts and implications leads into the textual material. Morrison's testimony before the Senate Atomic Energy Committee describes the damage done by the first bombs. It is followed by discussions of the ability of other nations to make atomic bombs, the probable future form of atomic warfare, and the question of a defense against atomic bombs. These sections serve to introduce the discussion of the necessity for and possibilities of international control. The need for a national control bill are illustrated by two articles dealing with the future use of atomic energy and of radioactive materials. The last portion of the book consists of an elementary discussion of the structure of the atom, the atomic bomb, piles, and isotope separation. An atomic science vocabulary and a bibliography of semi-technical and non-technical literature complete the volume.

The present edition has been limited to copies needed for distribution to the members of Congress, the ASC, and other FAtS groups. It is expected that a second edition may be made available to the public through the regular distribution channels.

QUINCY WRIGHT AND EDITH WYNNER ADDRESS THE ASC

Two recent meetings of the ASC were devoted to a continuation of the series of discussions of UNO and World Government as possible organs of international control of atomic energy.

On January 23, Miss Edith Wynner, co-author of the book "Searchlight on Peace Plans," continued Mr. Reves' argument (see this Bulletin No. 3) for a Federal World Government as the only real solution of the atomic bomb problem. She analyzed the concepts of alliance, confederation and federation from the legal and historical point of view and saw no possibility of a confederation, such as the UNO, developing gradually into a true world authority.

A different point of view was presented by Quincy Wright (Professor of International Law, University of Chicago) at the meeting on February 6. His belief is that the difference between confederation and federation is not a sharp one, and is a matter of attitude rather than of legal structure. For example, the United States were considered as a federation by one side in the conflict which this side called Civil War, or even War of Rebellion, and as a confederation by the other side, which called the same conflict War between the States. The important thing in Prof. Wright's view is the gradual growth of loyalty to the UNO, rather than the hasty erection of new legal structures. The UNO must strengthen its direct relation with the individual citizen—a type of relation already established in the so-called Bill of Human Rights and in the Nuremberg trials of war criminals.

In discussing the present UNO organization from the point of view of atomic energy control, Prof. Wright conceded that the veto right could prevent the enactment by the Security Council of any recommendation of the Atomic Energy Commission. He pointed out, however, that Section 51 of the Charter provides a certain corrective to the veto provision by legalizing "collective or individual self-defense." He implied that the refusal of a nation to submit to control provisions may be considered as sufficient reason for application of article 51.

Professor Wright thinks that in order to command respect the UNO must possess a certain number of atomic bombs —the only ones allowed into world. In this, he differs with many scientists, who have pointed out that atomic bombs are not suitable as police weapons and that it will be technically impossible to keep the UNO-owned bombs out of reach of any single power.

THE NAVY TEST OF THE ATOMIC BOMB

(Continued from Page One)

Naval vessels are mechanically stronger than buildings, so that over comparable distances, the effect of a bomb on a warship would be less than on a building. Most of the ships will be several miles away from the explosion, so that they will probably remain afloat. Those who have been led to expect the overwhelming destruction of the fleet will thus be disappointed and public opinion may be lulled into a feeling of false security — along the line of "Oh, the atomic bomb is not so terrible — it's just another big bomb."

The exact effects of an underwater explosion are much less clear at the present time than the effects of an overhead blast, but the Navy has stated that it expects that the atomic bomb will prove most effective against a dispersed fleet when used as a depth bomb. Because of physical properties of water, an underwater blast exercises a strong effect even at considerable distance from its center. Submarine hulks are caved in by depth charge explosions at a distance at which an explosion in air would cause only superficial damage. The pressure of an underwater atomic blast will hit surface ships at their bottoms, which are their least heavily armored parts.

We are therefore somewhat perturbed by the postponement of the underwate test. If all three tests are considere worth doing, we hope that sufficien time and personell will be made avai able for the proper preparation of a measurements, including the biologica ones, and that no general conclusion will be drawn before the completion o the third test.

The international repercussions of an display of atomic power must be care fully considered. It has still not bee made clear to just what extent foreig observers will participate in the propo ed tests. If such observers are excluded the tests can only be viewed by the re of the world as secret maneuvers wit the purpose of instructing our arme forces in the methods of atomic war fare. We fully agree with Senator Mc Mahon, who in his letter to the Pre ident said:

"I believe with you that these test should be witnessed by foreign observer so that as wide a dissemination as po sible of the fearful effects of this ne weapon will be had. Foreign observer would be invited not for the purpose o impressing them with our power bu rather that they might see and under stand why we, who know so much abou it, are so desperately anxious that i shall never again be used."

Midwest Conference With Religious Leaders

On February 7, at the final session of the conference between Midwestern religious leaders and scientists, it was resolved that "this body set up a committee of twelve, six scientists and six churchmen, the churchmen equally divided between Protestants,, Catholics and Jews, to affiliate with the National Committee on Atomic Information to consider areas of common interest."

It was further resolved "that this body undertake to educate the churches and the public on the necessity for world control of atomic energy, the necessity for implementing the work of the UNO looking forward to the eventual emergence of a world government, and for the support of the McMahon bill."

The committee of twelve consists of: Rabbi Jerome P. Folkman, Grand Rapids, Mich.; Rabbi Jacob J. Weinstein, Chicago; alternate, Rabbi Ralph Simon, Chicago; Dr. Charles O'Neil, Chicago; Rev. Leo R. Ward, C.S.C., Notre Dame; Dean Charles W. Gilkey, Chicago; Dr. Bernard Iddings Bell, Chicago; alternates, Dr. George Gibson, Chicago; Dr. Ernest F. Tittle, Evanston, Ill. and Warren Johnson, Kenneth C. Cole, Louis Wirth, Katherine Way, John Rose, Robert Moon.

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